

liquid crystal, which is advantageous. As an example of the tolan-base liquid crystal, the chemical formula of 4-alkylcyclohexyl-4'-alkyltran is shown below.



where R is an alkyl group and R' is an alkoxy group. In order to reduce the response time of the liquid crystal, it is good practice to continuously apply a low voltage to the liquid crystal. It is only necessary that this voltage is almost the same as a phase transition voltage or lower.

See the attached Appendix for the changes made to effect the above paragraph.

IN THE CLAIMS:

Please enter the amended claims as follows:

Q2

13. (Amended) A variable optical-property element according to claim 11, wherein said variable refractive-index substance whose molecules are periodically oriented satisfies the following condition:

$$0.5 \text{ nm} < S < \lambda$$

where S is a period of an orientation of said molecules and λ is a wavelength of light.

Q3

26. (Amended) A variable optical-property element according to claim 19, wherein said variable refractive-index substance is a liquid crystal that has a property of totally reflecting light with a particular wavelength, and said particular wavelength is outside a range of wavelengths of light used for said variable optical-property element.

Q4

34. (Amended) A variable optical-property element according to claim 20, wherein said variable refractive-index substance is a liquid crystal that has a property of

Q4
cont. totally reflecting light with a particular wavelength, and said particular wavelength is outside
a range of wavelengths of light used for said variable optical-property element.

See the attached Appendix for the changes made to effect the above claims.

Please add the following new claims:

S37
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~~--37. (New) A variable optical-property mirror having a reflecting surface and an aperture, wherein a shape of the aperture of said variable optical-property mirror is oblong, and the reflecting surface of said variable optical-property mirror is constructed to cause a direction of light emergent therefrom to be variable.~~

38. (New) A variable optical-property mirror according to claim 37, wherein a shape of the reflecting surface of said variable optical-property mirror is variable.

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39. (New) An optical apparatus, comprising:
a variable optical-property mirror having a reflecting surface and an aperture,
wherein a shape of the aperture of said variable optical-property mirror is oblong, and
the reflecting surface of said variable optical-property mirror is constructed to cause a
direction of light emergent therefrom to be variable,

wherein a shape of the reflecting surface of said variable optical-property mirror is
variable; and

wherein said optical apparatus is configured so that the shape of the aperture of said
variable optical-property mirror is oblong in a direction along an intersection where a plane
on which rays incident on and emergent from said variable optical-property mirror lie meets
said variable optical-property mirror, to thereby compensate aberrations including
astigmatism.

C2
contd

40. (New) An optical apparatus comprising:
a variable optical-property mirror having a reflecting surface and an aperture,
wherein a shape of the aperture of said variable optical-property mirror is oblong in a
direction along an intersection where a plane on which rays incident on and emergent from
said variable optical property mirror lie meets said variable optical-property mirror, and said
reflecting surface is constructed to cause a direction of exit light therefrom to be variable.

A5

41. (New) An imaging device, comprising:
an optical element having a plurality of rotationally asymmetric surfaces; and
a variable optical-property mirror disposed in a vicinity of said optical element.

42. (New) An imaging device according to claim 41, further comprising an image
sensor.

43. (New) An optical system, comprising:
a rotationally asymmetric surface; and
a variable optical-property mirror constructed with a variable shape mirror.

44. (New) An imaging device, comprising:
a rotationally asymmetric surface; and
a variable optical-property mirror constructed with a variable shape mirror.

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45. (New) An imaging device, comprising:
an optical element having a rotationally asymmetric surface;

C4
cont'd

a variable optical-property mirror constructed with a variable shape mirror; and
an image sensor,
wherein said variable optical-property mirror and said image sensor are placed on a
same substrate, and said variable optical property mirror and said optical element constitute a
whole or a part of an optical system.

A5

46. (New) An imaging device, comprising:
an optical element having a rotationally asymmetric surface;
a mirror or a variable optical-property mirror fabricated by lithography; and
an image sensor,
wherein said mirror and said image sensor are placed on a same substrate, and said
mirror and said optical element constitute a whole or a part of an optical system.

47. (New) An imaging device according to claim 41, 44 or 45, wherein said
mirror or said variable optical-property mirror is fabricated by lithography.

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48. (New) An imaging device according to claim 41, wherein each of said
variable optical-property mirror and an image sensor is disposed on a surface of said optical
element with a plurality of rotationally asymmetric surfaces.

49. (New) An optical system comprising:
a rotationally asymmetric surface; and
a variable optical-property mirror,
wherein said rotationally asymmetric surface defines only one plane of symmetry.

50. (New) An observation apparatus comprising:
an optical element having a rotationally asymmetric surface; and
a variable optical-property mirror.

51. (New) An observation apparatus according to claim 50, wherein said variable optical-property mirror is placed in a vicinity of said rotationally asymmetric surface.

52. (New) An observation apparatus according to claim 50, wherein said variable optical-property mirror is disposed in a vicinity of a prism having said rotationally asymmetric surface.

Q5 53. (New) An observation apparatus according to claim 50, further comprising a display element.

54. (New) An optical apparatus or an assembly of an optical apparatus comprising:
a substrate on which an image sensor or an optical element is formed; and
another optical element disposed in a vicinity of said substrate.

55. (New) An optical apparatus or an assembly of an optical apparatus according to claim 54, wherein said another optical element disposed in the vicinity of said substrate has a reflecting surface.

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56. (New) An optical apparatus or an assembly of an optical apparatus according to claim 54, wherein said optical apparatus or said assembly of an optical apparatus comprises a variable optical-property element.

57. (New) An optical apparatus, comprising:
a plurality of reflecting-type variable optical-property elements,
wherein said optical apparatus is configured to perform at least one of a zooming and a focusing operation.

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58. (New) An optical apparatus according to claim 57, further comprising an optical element.

59. (New) An optical apparatus according to claim 57, further comprising a lens.

60. (New) An optical apparatus according to claim 57, further comprising a display element.

61. (New) An optical apparatus according to claim 57, further comprising a display element and an image sensor.

62. (New) An optical apparatus according to claim 57, further comprising at least one of an infrared cutoff filter and a low-pass filter.

63. (New) An optical apparatus according to claim 57, further comprising a stop.

64. (New) An optical apparatus according to claim 57, further comprising a processor.

65. (New) An optical apparatus according to claim 57, further comprising a recorder.

66. (New) An optical apparatus according to claim 57, wherein said reflecting-type variable optical-property element is constructed with a variable shape mirror.

67. (New) An observation apparatus, comprising:
a variable focal-length optical system comprising a reflecting-type variable optical-property element; and
a display element.

68. (New) A display apparatus, comprising:
a variable focal-length optical system comprising a reflecting-type variable optical-property element; and
a display element.

69. (New) An optical apparatus, comprising:
a variable focal-length optical system comprising a reflecting-type variable optical-property element;
a display element; and
an image sensor.

70. (New) An apparatus according to claim 67, 68 or 69, further comprising an optical element.

71. (New) An apparatus according to claim 67, 68 or 69, further comprising a lens.

72. (New) An imaging apparatus, comprising:
a variable focal-length optical system comprising:
a reflecting-type variable optical-property element; and
at least one of an infrared cutoff filter and a low-pass filter.

73. (New) An apparatus according to claim 67, 68 or 69, wherein a stop is disposed in said variable focal-length optical system.

74. (New) An apparatus according to claim 67, 68 or 69, further comprising a processor.

75. (New) An apparatus according to claim 67, 68 or 69, further comprising a recorder.

76. (New) An apparatus according to claim 67, 68 or 69, wherein said reflecting-type variable optical-property element is constructed with a variable shape mirror.

77. (New) An optical apparatus, comprising
an optical element molded from a material which is plastic or glass; and

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cont.

a reflecting-type variable optical-property element.

78. (New) An optical apparatus, comprising:

an optical element molded from a material which is plastic or glass;

an image sensor; and

a reflecting-type variable optical-property element.

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cont.,

79. (New) An optical apparatus comprising:

an optical element molded from a material which is plastic or glass;

an image sensor;

a display element; and

a reflecting-type variable optical-property element.

80. (New) An optical apparatus comprising:

an optical element molded from a material which is plastic or glass;

an image sensor;

a display element; and

a reflecting-type variable optical-property element fabricated by lithography.--
